



Environment and Natural Resources Trust Fund

2026 Request for Proposal

General Information

Proposal ID: 2026-151

Proposal Title: Bugs Below Zero: Connecting Communities with Winter Science

Project Manager Information

Name: Rebecca Swenson

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

Office Telephone: (612) 625-3866

Email: boli0028@umn.edu

Project Basic Information

Project Summary: Bugs Below Zero engages classrooms and communities in winter science, raises awareness about stream food webs through interactive events, and inspires future scientific researchers and environmental stewards.

ENRTF Funds Requested: \$428,000

Proposed Project Completion: June 30, 2029

LCCMR Funding Category: Education and Outdoor Recreation (C)

Project Location

What is the best scale for describing where your work will take place?

Statewide

What is the best scale to describe the area impacted by your work?

Statewide

When will the work impact occur?

During the Project and In the Future

Narrative

Describe the opportunity or problem your proposal seeks to address. Include any relevant background information.

Insects are everywhere during summer, but what happens to them during winter? How do certain insects remain active in freezing temperatures, and what is their role in stream food webs? Despite Minnesota's long winters, there is little awareness of cold-adapted insects and their vital role in groundwater-fed streams. At the same time, there is demand among teachers and communities for science-based outdoor learning experiences. To fill this gap, we are expanding our Bugs Below Zero program, led by a multidisciplinary team of experts in communication, education, entomology, and fisheries. This program encourages participants to learn, observe, and collect data on insects that complete their life cycle during winter, leaving streams as adult insects that are active on the snow. The proposed activities will enhance outreach, community-building, engagement, education and data-sharing among Bugs Below Zero participants. This project expansion creates new teacher development resources, classroom activities aligned with state standards, and place-based learning experiences for classrooms of all levels during winter, a time when experiential learning opportunities are limited. Increasing awareness of the importance of winter insects and how they maintain healthy aquatic ecosystems and stable fish populations will enhance support for environmental science and encourage stewardship of Minnesota's natural resources.

What is your proposed solution to the problem or opportunity discussed above? Introduce us to the work you are seeking funding to do. You will be asked to expand on this proposed solution in Activities & Milestones.

This project aims to expand access to educational resources that highlight winter-active aquatic insects and create engaging, interactive events that inspire families, outdoor enthusiasts, educators, and classrooms to explore winter aquatic science and stream food webs. By connecting communities and classrooms with winter water science, new audiences will learn to identify and understand the importance of aquatic insects, including the crucial role of cold-adapted insects in Minnesota streams. Additionally, we provide opportunities to engage in hands-on scientific research, allowing participants to better understand and value Minnesota's natural resources.

We are seeking funding to:

- Create a series of events that allow students, families, outdoor enthusiasts, and community members to meet Minnesota's winter aquatic insects and learn about their vital role in winter stream food webs. Events will include interactive insect demonstrations, connecting weather, streams, aquatic insects, and fish.
- Develop new classroom resources and offer professional development for Minnesota teachers. We will create lesson plans and educational resources aligned with state education standards and lead teacher workshops that provide educators with toolkits for their classrooms. Additionally, workshops will connect Minnesota teachers with the Bugs Below Zero project researchers.
- Strengthen community-building, engagement, data sharing, and communication systems to expand our participatory science program.

What are the specific project outcomes as they relate to the public purpose of protection, conservation, preservation, and enhancement of the state's natural resources?

Minnesota's cold weather offers valuable insights for researchers globally, aiding in the understanding of interactions between weather, water, insects, and food webs during freezing temperatures. The specific outcomes for this project include: 1) Increasing awareness of winter science, 2) Inspiring Minnesotans of all ages to explore the winter dynamics of our aquatic systems, 3) Engaging new classrooms and communities in winter data collection, and 4) Encouraging ongoing participation in environmental stewardship.

Activities and Milestones

Activity 1: Public engagement and outreach events that raise community awareness of and interest in winter science, educational resources, and environmental stewardship

Activity Budget: \$148,286

Activity Description:

The Bugs Below Zero team will support a series of public outreach events, hosting at least three per year, targeting K-12 students, educators, naturalists, conservation organizations, and families. These events will feature interactive presentations by University of Minnesota and Southwest Minnesota State University experts and include hands-on demonstrations with live insects. The content will enhance understanding of stream food webs and the connections between healthy water habitats, aquatic insects, and trout populations. Additionally, these events will provide training and inspiration for participants to engage with the Bugs Below Zero participatory science program. Some events will be held at nature centers, natural history museums, and environmental learning centers, such as Eagle Bluff, River Bend Nature Center, and the Bell Museum, with robust public outreach networks. In addition we will present our hands-on materials at events aimed at K-12 audiences, such as the Southwest Minnesota Environmental Fair that engages fifth and sixth grade students in outdoor environmental science. We will teach students about winter stream ecology through live and digital demonstrations and create supporting digital content, like streaming videos, podcasts, recorded presentations, and demos, that align with the event and expand our reach.

Activity Milestones:

Description	Approximate Completion Date
Hold at least one outreach event at Eagle Bluff Environmental Learning Center or similar venue	June 30, 2027
Hold at least one outreach event at River Bend Nature Center or similar venue	June 30, 2028
Hold at least one outreach event in conjunction with the Bell Museum programs or similar	June 30, 2029
Participate in at least two K-12 outreach events per year in conjunction with partner organizations	June 30, 2029

Activity 2: Educator professional development to support practices for K-12 participatory science through awareness of winter science and environmental education.

Activity Budget: \$144,627

Activity Description:

The Bugs Below Zero team is excited to offer a series of professional development opportunities for teachers. The professional development will incorporate science and engineering practices for K-12 students emphasized in the new Minnesota science standards. Bugs Below Zero scientists and educators from the University of Minnesota and Southwest Minnesota State University will deliver engaging and interactive workshops, including activities with live insects. These sessions are designed to enhance educators' understanding of stream food webs, the importance of healthy water habitats, and the role of aquatic insects in supporting trout populations. Educators will receive training and curricular resources, digital content, and lesson plans to integrate the Bugs Below Zero participatory science program into their classroom or school. At the conclusion of the training, educators will be eligible for grant funding for kits for successful implementation of Bugs Below Zero observations and analysis activities. To reach a broad audience of teachers, event locations will be held around the state, including locations in both the metro and greater Minnesota. These professional development events aim to equip teachers with the knowledge and tools to inspire their students and foster a deeper connection with environmental science.

Activity Milestones:

Description	Approximate Completion Date
Plan and host at least one professional development for K12 teachers in the metro area.	June 30, 2027
Plan and host at least one professional development for K12 teachers in southwestern Minnesota.	June 30, 2028
Plan and host at least one professional development for K12 teachers in central Minnesota.	June 30, 2029

Activity 3: Building Bugs Below Zero participatory science program and communication resources

Activity Budget: \$135,087

Activity Description:

Between 2023-2025, Bugs Below Zero developed a participatory science program where participants walk snow-covered stream banks, identify and count winter active insects, and describe insect behavior and activity. To date, Bugs Below Zero has created a strong base of community and classroom participants, including Master Naturalists, K-16 students and instructors, and other interested members of the public. We intend to expand this network and build a more robust dataset that will both inform research on the biology of winter active insects and potential impacts of temperature change and habitat use on these species while also providing data as an educational tool for classroom use. We will continue to develop online training resources and host seminars, workshops, and educational coaching for participants, providing them with skills needed to engage in our participatory science program. We will create web content, blog posts and/or social media content to share research highlights and engage a wider audience. Additionally, we will provide presentations at education or ecology-themed conferences, with goals of raising the awareness of Bugs Below Zero, highlighting accomplishments, and expanding data collection efforts, and promoting a greater understanding of winter insect ecology.

Activity Milestones:

Description	Approximate Completion Date
Develop/expand participatory science training tools.	June 30, 2027
Engage educators, classrooms, and outdoor recreationalists with the Bugs Below Zero participatory science program	June 30, 2029
Encourage use of datasets in the classroom and evaluate engagement of participants.	June 30, 2029

Project Partners and Collaborators

Name	Organization	Role	Receiving Funds
Alyssa Anderson	Southwest Minnesota State University, Biology Program	Anderson is an aquatic entomologist with expertise in winter active insects. She will help plan and execute events, provide entomology and aquatic ecology expertise to event and communication materials, interact with Bugs Below Zero volunteers, act as lead for the community science activity, and review data provided by the program.	Yes
Dean Hansen	Wet Bugs, LLC	Hansen is an aquatic entomologist and owner of Wet Bugs, which provides interactive educational workshops. He will provide interactive, live demonstrations of aquatic insects and related equipment during the events.	Yes
Troy McKay	University of Minnesota, Agricultural Education & Communication	McKay is a digital media instructor who will help support the creation of digital educational resources (like videos, podcasts, and photo tours) that result from the events.	Yes
Kandy Noles Stevens	Southwest Minnesota State University, School of Education	Noles Stevens is a STEM teacher education specialist and veteran educator who will support teacher education to promote BBZ to K12 schools. She will lead educator professional development and the dissemination of curricular resources.	Yes
Amy Schrank	University of Minnesota Sea Grant	Schrank will help plan and execute events, provide fisheries expertise to events and materials, and help communicate event and educational materials through University of Minnesota Sea Grant channels.	Yes
Bruce Vondracek	University of Minnesota	Vondracek is an emeritus professor in the Department of Fisheries, Wildlife, and Conservation Biology at the University of Minnesota. He will help plan and execute events.	No
Holly Menninger	Bell Museum	Menninger will be the contact person for the Bell Museum and will coordinate staff support, facilities, and communication support for Bugs Below Zero events hosted by the Bell Museum.	Yes
Colleen Foehrenbacher	Eagle Bluff Environmental Learning Center	Foehrenbacher will serve as the primary contact for Eagle Bluff Environmental Learning Center and will coordinate staff support, facilities, and communication support for Bugs Below Zero events hosted by Eagle Bluff	Yes
Brittany Smith	River Bend Nature Center	Smith will serve as the primary contact for River Bend Nature Center and will coordinate staff support, facilities, and communication support for Bugs Below Zero events hosted by River Bend	Yes

Long-Term Implementation and Funding

Describe how the results will be implemented and how any ongoing effort will be funded. If not already addressed as part of the project, how will findings, results, and products developed be implemented after project completion? If additional work is needed, how will this work be funded?

The educational resources developed through this project will be publicly accessible on the Bugs Below Zero website, beyond the close of this project. These resources, including videos, blog posts, lesson plans, and infographics, will serve as ongoing, valuable tools for educators and families interested in aquatic insects and the winter dynamics within aquatic ecosystems. We will share insights from our participatory science efforts with academic journals, at professional conferences, and with environmental stewardship organizations. Our goal is to equip teachers and classrooms with resources that they can continue to use, inspiring a new generation of environmental stewards.

Other ENRTF Appropriations Awarded in the Last Six Years

Name	Appropriation	Amount Awarded
Bugs Below Zero: Engaging Citizens in Winter Research	M.L. 2022, , Chp. 94, Art. , Sec. 2, Subd. 05e	\$198,000

Project Manager and Organization Qualifications

Project Manager Name: Rebecca Swenson

Job Title: Associate Professor, College of Food, Agricultural, & Natural Resource Sciences, University of Minnesota

Provide description of the project manager's qualifications to manage the proposed project.

Rebecca Swenson will serve as the project manager. She will plan and execute events, develop an outreach plan, draft communication content, manage student workers, engage with Bugs Below Zero volunteers, and support the creation and development of all educational materials and partnerships. Dr. Swenson has been teaching courses related to agricultural and environmental science communication in the College of Food, Agricultural and Natural Resource Sciences (CFANS) at the University of Minnesota since 2012. She collaborated with a team of University of Minnesota students and faculty experts in communication, entomology, and fisheries, wildlife, and conservation biology to develop the initial Bugs Below Zero pilot materials and program. Her research focuses on science communication and engagement, particularly in agricultural and environmental storytelling, science communication training, community-building, and public engagement with science. Prior to her current role, Dr. Swenson worked in marketing communication. She holds a Bachelor's degree in journalism from the University of Wisconsin-Madison and a Master's degree and PhD in Mass Communication from the University of Minnesota.

Organization: U of MN - College of Food, Agricultural and Natural Resource Sciences

Organization Description:

The Agricultural Education, Communication & Marketing (AECM) department at the University of Minnesota equips students to become successful leaders, educators, and communicators in the agricultural, food, and natural resource sectors. The department offers a comprehensive curriculum in education, communication, and marketing for both undergraduate and graduate students. Courses include writing, public speaking, podcasting, visual design, video production, and virtual or streaming field trips. The AECM department is part of the College of Food, Agricultural & Natural Resource Sciences (CFANS) at the University of Minnesota. Agricultural and environmental stories produced by students can be viewed at UMNAgricast.com.

Budget Summary

Category / Name	Subcategory or Type	Description	Purpose	Gen. Ineligible	% Benefits	# FTE	Classified Staff?	\$ Amount
Personnel								
Project Manager		Serve as project director. Manage timelines and work of the grant. Lead planning of events, outreach work, and manage communication activities. Coordinate meetings and partner relationships. Provide science communication expertise.			36.6%	0.51		\$106,565
Co-Investigator		Help plan and execute events, provide fisheries expertise to events and materials, and help communicate event and educational materials through partner communication channels. Plan and execute events, provide fisheries expertise.			36.6%	0.15		\$22,821
Collaborator		Help support the creation of digital educational resources (like videos, podcasts, and photo tours).			36.6%	0.24		\$35,770
Gallery Programs Coordinator		Assist with events at the Bell Museum. Help plan public outreach events that include hands-on demonstrations of aquatic insects and environmental materials for K12 students, educators, naturalists, and families. Coordinate staff support, facilities, and communication support for events hosted at the Bell.			36.6%	0.01		\$1,500
Public Programs Assistant		Assist with events at the Bell Museum. Help plan public outreach events that include hands-on demonstrations of aquatic insects and environmental materials for K12 students, educators, naturalists, and families. Coordinate staff support, facilities, and communication support for events hosted at the Bell.			32.3%	0.01		\$1,500
2 Undergraduate students		Assist with drafting communication content, running video equipment, supporting video editing, editing the Bugs Below Zero website, supporting event planning and execution, and interacting with researchers from communication, entomology, and fisheries, in order to help understand the research and translate insights for public audiences.			0%	1.14		\$66,763

							Sub Total	\$234,919
Contracts and Services								
Subaward to SMSU	Subaward	Activities include participation in public engagement and outreach events, development of educational resources, leading educator professional development, expanding the participatory science program and contributing to professional presentations. Personnel: \$136,781, Printing: \$3,000, Supplies: \$17,300, Travel: \$7,500.				1.14		\$164,581
Riverbend	Subaward	River Bend will help plan public outreach events that include hands-on demonstrations of aquatic insects and environmental materials for K12 students, educators, naturalists, and families. River Bend will coordinate staff support, facilities, and communication support and host events.				0.1		\$3,000
Eagle Bluff	Subaward	Eagle Bluff will help plan public outreach events that include hands-on demonstrations of aquatic insects and environmental materials for K12 students, educators, naturalists, and families. Eagle Bluff will coordinate staff support, facilities, and communication support and host events.				0.1		\$3,000
Wet Bugs	Service Contract	Funds are requested for contractual services to Wet Bugs, LLC., an interactive workshop provided by Dean Hansen. Wet Bugs is a private business that specializes in interactive, educational workshops with live insects. These funds will allow us to include the Wet Bugs interactive workshop at in-person and virtual events.				0.3		\$1,800
							Sub Total	\$172,381
Equipment, Tools, and Supplies								
	Tools and Supplies	Website hosting, renewal, and online storage	We are requesting funds to cover the cost of website hosting, domain renewal, and storage space required to share digital					\$1,500

			resources on the Bugs Below Zero website (\$500/year).					
	Tools and Supplies	Insect Guide for Teachers (20 per year at \$40 per guide)	Funds are requested for copies of a guide for monitoring of aquatic invertebrates of the Upper Midwest (http://midge.dl.umn.edu/midwest-guide). We plan to share the guide with teachers and their classrooms. We anticipate sharing 20 copies of the guide per year. (20 copies of guide per year, \$40/each, ~60 copies total)					\$2,400
							Sub Total	\$3,900
Capital Expenditures								
							Sub Total	-
Acquisitions and Stewardship								
							Sub Total	-
Travel In Minnesota								
	Miles/ Meals/ Lodging	Year 1 travel (approx 5 people; \$720 per person)	Funds are requested for the project team to travel to outreach events and K12 trainings (mileage, vehicles, hotel) in year 1. This also includes funds to travel to locations for any interviews or photo/video shoots needed to create digital resources. (Funds are budgeted at approximately \$720/year for Swenson, Schrank, McKay, and both undergraduate students).					\$3,600
	Miles/ Meals/ Lodging	Year 2 travel (approx 5 people; \$720 per person)	Funds are requested for the project team to travel to outreach events and K12 trainings (mileage, vehicles, hotel) in year 2. This also includes funds to travel to locations for any interviews or photo/video shoots needed to create digital resources. (Funds are budgeted at approximately \$720/year for Swenson,					\$3,600

			Schrank, McKay, and both undergraduate students).					
	Miles/ Meals/ Lodging	Year 3 travel (approx 5 people; \$720 per person)	Funds are requested for the project team to travel to outreach events and K12 trainings (mileage, vehicles, hotel) in year 3. This also includes funds to travel to locations for any interviews or photo/video shoots needed to create digital resources. (Funds are budgeted at approximately \$720/year for Swenson, Schrank, McKay, and both undergraduate students).					\$3,600
							Sub Total	\$10,800
Travel Outside Minnesota								
							Sub Total	-
Printing and Publication								
	Printing	Communication material development - Year 1	We are requesting \$2000/year to cover the cost of printing and mailing of communication materials (postcards, brochures, flyers) to share details about the Bugs Below Zero program, classroom resources, and to send follow-up information to participants.					\$2,000
	Printing	Communication material development - Year 2	We are requesting \$2000/year to cover the cost of printing and mailing of communication materials (postcards, brochures, flyers) to share details about the Bugs Below Zero program, classroom resources, and to send follow-up information to participants.					\$2,000
	Printing	Communication material development - Year 3	We are requesting \$2000/year to cover the cost of printing and mailing of communication materials (postcards, brochures, flyers) to share details about the Bugs Below Zero program, classroom resources, and to send follow-up information to participants.					\$2,000

							Sub Total	\$6,000
Other Expenses								
							Sub Total	-
							Grand Total	\$428,000

Classified Staff or Generally Ineligible Expenses

Category/Name	Subcategory or Type	Description	Justification Ineligible Expense or Classified Staff Request
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Non ENRTF Funds

Category	Specific Source	Use	Status	Amount
State				
			State Sub Total	-
Non-State				
			Non State Sub Total	-
			Funds Total	-

Total Project Cost: \$428,000

This amount accurately reflects total project cost?

Yes

Attachments

Required Attachments

Visual Component

File: [5154ca1b-d34.pdf](#)

Alternate Text for Visual Component

This postcard provides an overview of the Bugs Below Zero program...

Supplemental Attachments

Capital Project Questionnaire, Budget Supplements, Support Letter, Photos, Media, Other

Title	File
UMN SPA Approval Letter	cf043406-dbd.pdf
Example social media post BBZ	e862654c-840.pdf
BBZ brochure	5cde5b22-a31.pdf
Support Letter - Riverbend	6db21af7-581.pdf
Support Letter - Eagle Bluff	a4fb5188-b8c.pdf

Administrative Use

Does your project include restoration or acquisition of land rights?

No

Do you understand that travel expenses are only approved if they follow the "Commissioner's Plan" promulgated by the Commissioner of Management of Budget or, for University of Minnesota projects, the University of Minnesota plan?

Yes, I understand the UMN Policy on travel applies.

Does your project have potential for royalties, copyrights, patents, sale of products and assets, or revenue generation?

No

Do you understand and acknowledge IP and revenue-return and sharing requirements in 116P.10?

N/A

Do you wish to request reinvestment of any revenues into your project instead of returning revenue to the ENRTF?

N/A

Does your project include original, hypothesis-driven research?

No

Does the organization have a fiscal agent for this project?

Yes, Sponsored Projects Administration

Does your project include the pre-design, design, construction, or renovation of a building, trail, campground, or other fixed capital asset costing \$10,000 or more or large-scale stream or wetland restoration?

No

Do you propose using an appropriation from the Environment and Natural Resources Trust Fund to conduct a project that provides children's services (as defined in Minnesota Statutes section 299C.61 Subd.7 as "the provision of care,

treatment, education, training, instruction, or recreation to children")?

No

Provide the name(s) and organization(s) of additional individuals assisting in the completion of this proposal:

Melissa Sullivan, University of Minnesota

Do you understand that a named service contract does not constitute a funder-designated subrecipient or approval of a sole-source contract? In other words, a service contract entity is only approved if it has been selected according to the contracting rules identified in state law and policy for organizations that receive ENRTF funds through direct appropriations, or in the DNR's reimbursement manual for non-state organizations. These rules may include competitive bidding and prevailing wage requirements

Yes, I understand

